Claims:

1. A method of removing components of an injection mold machine, said machine comprising the following components: a core assembly including a master core plate, a core plate releasably secured to said master core plate, said master core plate including guide means for guiding said core plate relative to said master core plate; a core insert secured to said core plate; a cavity assembly comprising a manifold plate, a first cavity plate releasably secured to the manifold plate, said first cavity plate oriented in the opposing direction to the core plate, a cavity insert attached to the cavity plate, said cavity assembly moveable relative to the core assembly such that the cavity insert and core insert may be selectively mated together to define a cavity therebetween into which molten plastic may be injected from a molten plastic source, said cavity forming a shape of a desired article, said method comprising the steps of:

(a) moving the core assembly and cavity assembly into a closed position whereat the cavity insert and core insert are mated together;

(b) securing said core plate to said cavity plate, thereby forming a mold module;

(c) releasing the securing means which secures the cavity plate to the manifold plate;

(d) opening the mold from the closed position, until the first cavity plate disengages the manifold plate and all connections thereto,

(e) releasing the securing means which secures the core plate to the master core plate;

(f) lifting said mold module in a direction perpendicular to the direction of motion between said open and closed position, said module being guided in in said perpendicular direction by said guide means.

2. A method of removing components of a stack injection mold machine, said machine comprising: a stationary core assembly and an opposing facing moving

core assembly each core assembly including a master core plate, and a core plate releasably secured to the master core plate, a first core insert secured to said core plate, an intermediate cavity assembly comprising two central manifold plates secured to each other, a pair of cavity plates releasably secured on either side of said manifold plates, each cavity plate having a cavity insert, said cavity assembly and moving core assembly movable by moving mold press means in such a manner that the core inserts and cavity inserts are separated by equal amounts on either side of the cavity assembly, and may be mated together simultaneously, the cavity and core inserts defining a cavity therebetween each, into which molten plastic may be injected from a molten plastic sourse, said cavities forming the shape of a desired article, the method comprising the following steps:

(a) moving the core assemblies and cavity assembly into a closed position whereat the mating cavity inserts and core inserts are mated together;

(b) securing the core plates to their respective mating cavity plates to form respective mold modules comprised of core plates, core inserts, cavity inserts and cavity plates;

(c) releasing the securing means which secures the cavity plates to the manifold plate;

(d) moving the moving core assembly and cavity assembly from the closed position to an open position until said cavity plates are separated from said manifold plate and all connections thereto;

(e) releasing said securing means which secures said core plates to said respective core plates;

(f) hoisting said first and second mold modules simultaneously outwardly in a direction perpedicular to the direction of motion between said open and closed position, said modules being guided in said perpendicular direction by guiding means which guides said core plates perpendicularly along said master core plates.

3. The method as recited in claim 1 or 2, wherein said guide means comprises a set of roller guides secured to the master core plate and rollingly engaging said first core plate, said guide means following a guide path perpendicular to the motion of the mold machine, facilitating removal of said mold module from said mold machine.

4. The method as recited in claim 3 wherein said roller guides guide the core plate relative to said master core plate along a countoured slot defined in the master core plate, said slot being shaped to allow core plate to move vertically and parallel to master core plate for an initial period thereby causing disengagement of quick disconnect couplings between plates, then shaped to allow the core plate (and attached module) to move slightly away from the master core plate so that the mold module may be then be rapidly hoisted out of the mold machine.

5. The method as recited in claim 2 further comprising the step of applying an hoist attachment member simultaneously to the periphery of each said module when in closed position, said modules being slidably engaged to said hoist attachment, slidable in the direction of opening and closing the mold machine, such that when said modules are attached to the hoist attachment, they may be moved to the open position to allow said separation of cavity plates and components therefrom, and once said modules are so separated, hoisting said hoist attachment.

6. The method as recited in claim 5 wherein said hoist attachment further includes a stop at opposite ends thereof, which limits the sliding movement of each block beyond the point where said cavity plates and components thereof are separated from said manifold plate and accommodates replacement modules with the same dimensions.

7. The method as recited in claim 1 or 2 comprising the further step of attaching hoisting means to each said mold module after said step (d) and prior to said step (e).

8. The method as recited in claims 1 or 2, wherein said mold machine defines water and air conduits extending between at least two adjacent plates, said conduits being selectively disengageable and reengageable by quick disconnect couplings.

9. The method as recited in claim 2 wherein mating locating keys are positioned to locate said modules for reattachment upon said mold machine.

10. The method as recited in claim 1 to 4 wherein said securing means are releasable straps secured across the periphery of said plates.

11. A method of removing components of an injection mold machine, said machine comprising the following components: a core assembly including a master core plate, a cavity plate releasably secured to said master core plate, said master core plate including guide means for guiding said cavity plate relative to said master core plate; a cavity insert secured to said cavity plate, an intermediate assembly comprising manifold plates, a first core plate releasably secured to the manifold plate, said first core plate oriented in the opposing direction to the cavity plate, a core insert attached to the core plate, said intermediate assembly moveable relative to the core assembly such that the cavity insert and core insert may be selectively mated together to define a cavity therebetween into which molten plastic may be injected from a molten plastic source, said cavity forming a shape of a desired article, said method comprising the steps of:

(a) moving the core assembly and intermediate assembly into a closed position whereat the cavity insert and core insert are mated together;

(b) securing said core plate to said cavity plate, thereby forming a mold module;

(c) releasing the securing means which secures the core plate to the manifold plate;

(d) opening the mold from the closed position, until the first core plate disengages the manifold plate and all connections thereto,

(e) releasing the securing means which secures the cavity plate to the master core plate;

(f) lifting said mold module in a direction perpendicular to the direction of motion between said open and closed position, said module being guided in in said perpendicular direction by said guide means.

12. A hoist bar, comprising a main bar having an upper side and a lower side, and a pair of blocks secured to the lower side of said bar at opposite ends thereof, each block having an opening parallel to the length of the bar, said bar having at least one hoist member secured to the upper side of the bar, said hoist bar adapted for lifting said bar, a guide pin extending through the opening in each said block, said guide pins having mounting blocks at the end of each guide pin, which limit the sliding movement of the guide pins within each opening, each said mounting block being adapted to mount a mold plate, thereby when said mounting blocks are mounted to said plates, said plates may slide relative to the main bar, and said hoist bar may be lifted when said mounted mold plates have slid into a selectable relative sliding position on the lift bar.

13. A hoist bar comprising a main bar having an upper side and a lower side, and a pair of blocks secured to the lower side of said bar at opposite ends thereof, each block having an opening parallel to the length of the bar, said bar having at least one hoist member secured to the upper side of the bar, said hoist bar adapted for lifting said bar, a guide pin extending through the opening in each said block, said guide pins having mounting blocks at the end of each guide pin, which

limit the sliding movement of the guide pins within each opening, each said mounting block being adapted to mount a mold plate, thereby when said mounting blocks are mounted to said plates, said plates may slide relative to the main bar, and said hoist bar may be lifted when said mounted mold plates have slid into a selectable relative sliding position on the lift, the hoist bar being used in the method of claim 3 such that one mounting block on each pin is secured to the core plate of a module and the other mounting block is secured to the cavity plate of the same module.

14. The method as recited in claim 1, 2 or 11 wherein a mold support apparatus supports the mold plates within said mold machine, said apparatus comprising a mold support piece interconnecting said plates to said machine, said support pieces releasably engageable to one said plate and the tie bars or guide ways of said machine, said support pieces being adaptable in size to interconnect plates of various sizes to machines of various sizes.

15. The method as recited in claim 14 wherein said support pieces when disengaged from said machine may be moved to an inoperable position, nested within a mold plate.

16. An apparatus for removing components of an injection mold machine, said machine comprising the following components: a core assembly including a master core plate, a core plate releasably secured to said master core plate, said master core plate including guide means for guiding said core plate relative to said master core plate; said core plate, a core insert secured to said core plate, the core insert having a front face; a cavity assembly comprising a manifold plate, a first cavity plate releasably secured to the manifold plate, said first cavity plate oriented in the opposing direction to the core plate, a cavity insert attached to the cavity plate, said cavity assembly moveable relative to the core assembly such that the cavity insert and core insert may be selectively mated together to define a cavity

therebetween into which molten plastic may be injected from a molten plastic source, said cavity forming a shape of a desired article, wherein the core assembly and cavity assembly may be moved into a closed position whereat the cavity insert and core insert are mated together, the core plate may be secured to said cavity plate, thereby forming a mold module; the securing means which secures the cavity plate to the manifold plate may be released, the mold may be moved from the closed position, until the first cavity plate disengages the manifold plate and all connections thereto and all securing means which secures the core plate to the master core plate may be released, and the module may be lifted in a direction perpendicular to the direction of motion between said open and closed position, said module being guided in said perpendicular direction by said guide means.

17. An apparatus for removing components of a stack injection mold machine, said machine comprising: a stationary core assembly and an opposing facing moving core assembly each core assembly including a master core plate, and a core plate releasably secured to the master core plate, said core plate having a face, a first core insert secured to said core plate face, an intermediate cavity assembly comprising central manifold plates, a pair of cavity plates releasably secured on either side of said manifold plates, each cavity plate having a cavity insert, said cavity assembly and moving core assembly movable by moving mold press means in such a manner that the core inserts and cavity inserts are separated by equal amounts on either side of the cavity assembly, and may be mated together simultaneously, the cavity and core inserts defining a cavity therebetween each, into which molten plastic may be injected from a molten plastic source, said cavities forming the shape of a desired article, wherein the core assemblies and cavity assembly may be moved into a closed position whereat the mating cavity inserts and core inserts are mated together and the core plates may be secured to their respective mating cavity plates to form respective mold modules comprised of core plates, core inserts, cavity inserts and cavity plates; and securing means which secures the cavity plates to the manifold plate may be

released; the moving core assembly and cavity assembly may be from the closed position to an open position until said cavity plates are separated from said manifold plate and all connections thereto; said securing means which secures said core plates to said respective core plates may be released and said first and second mold modules may be simultaneously hoisted outwardly in a direction perpedicular to the direction of motion between said open and closed position, said modules being guided in said perpendicular direction by guiding means which guides said core plates perpendicularly along said master core plates.

18. The apparatus as recited in claim 16 or 17, wherein said guide means comprises a set of roller guides secured to the master core plate and rollingly engaging said first core plate, said guide means forming a guide path perpendicular to the motion of the mold machine, facilitating removal of said mold module from said mold machine.

19. The apparatus as recited in claim 18 wherein said roller guides guide the core plate relative to said master core plate along a countoured slot defined in the master core plate, said slot being shaped to allow core plate to move vertically and parallel to master core plate for an initial period thereby causing disengagement of quick disconnect couplings between plates, then shaped to allow the core plate (and attached module) to move away from the master core plate so that the mold module may be then be rapidly hoisted out of the mold machine.

20. The apparatus as recited in claims 16 to 19 wherein the position of said cavity plates and core plates are exchanged.

21. The apparatus as recited in claim 17 further comprising a hoist attachment member secured simultaneously to the periphery of each said module when in closed position, said modules being slidably engaged to said hoist attachment, slidable in the direction of opening and closing the mold machine, such that when

said modules are attached to the hoist attachment, they may be moved to the open position to allow said separation of cavity plates and components therefrom, and once said modules are so separated, hoisting said mold modules.

22. The apparatus as recited in claim 21 wherein said hoist attachment further includes a stop at opposite ends thereof, which limits the sliding movement of each block beyond the point where said cavity plates and components thereof are separated from said manifold plate.

23. An apparatus as recited in any one of claims 16 to 22 wherein said machine further comprises an ejector plate operable to assist in ejection of the molded article from within said cavity, said ejector plate defining a slot therethrough extending from a central portion of said plate to a peripheral portion of the plate, said plate having a linking plate secured across said slot at said peripheral portion to reinforce said plate across said slot.

24. An apparatus for supporting mold plates within a mold machine, said apparatus comprising: a mold support member, said support member being positionable in an operable position whereat said support member interconnects said plate to a tie bar or guide way of the mold machine, allowing riding of said plate on said tie bar or guide way and positionable in an inoperable position.

25. An apparatus as recited in claim 24 wherein said mold plate includes a pocket shaped to accept support pins which are moveable within said pocket between an *extended* position where they stick out towards said tie bars and position the support member in the operable position, and a *retracted* position where they are located in the pockets of the mold plates, below the surface of these plates in the inoperable position, said support pins being guided by bushings held in fixed position in mold plates, a stopper being used to secure each support pin in one of the positions, and to prevent it from disengaging from the mold plate.

26. An apparatus as recited in claim 25 wherein said mold support apparatus includes, bracket portion, a support pad and a locating key, the bracket being secured to the pin, the bracket being fastened to the support pad which has a surface shaped to rest onto the tie bars of the injection machine, said locating key locating the support pad in reference to the bracket.

27. The apparatus as recited in claim 26 wherein the support pad is made of a material with low coefficient of friction, in order to avoid scoring the tie bars of the injection machine.

28. The apparatus as recited in claim 26 wherein said support pin has multiple locations for the stopper, thus providing more than one operating position and said size variability.

29. The apparatus as recited in claim 26 which is adapted to ride on machine guide ways.

30. The apparatus as recited in claim 24 wherein the mold support mechanism is permanently attached to a mold plate, pivotable around a pivot point of such plate between said operable position and said inoperable position, said inoperable position being where said mechanism is positioned within a pocket defined in said plate.

31. An apparatus for installing and tightening a mold module in a mold system, said module comprising a cavity plate, core plate secured to each other, said mold system comprising a master core plate, and water manifold said mold module being insertable into said mold system by positioning said module adjacent said water manifold, and centering said module relative to said master core plate, at which point tightening means interconnected between a fixed portion of the mold

system and a position on the module may be operable to selectively pull in tight engagement said mold module to said water manifold.

32. The apparatus as recited in claim 32 wherein said tightening means comprises a hooked handle, attached onto the surface of said water manifold, a pin installed onto the mold core plate of the mold module, wherein when said module is lowered into the injection machine, the handle positioned in a release position where said handle does not engage said pin, and when the mold core plate comes to a stop resting onto the water manifold, the handle is rotated to the holding position, wherein the hook handle engages said pin of the core plate, pulling the core plate firmly against the water manifold.

33. The apparatus as recited in claim 26 wherein said bracket portion may be adjustable in size to accommodate various spacings of said tie bars and guide ways.